

**CLAIMS**

What is claimed is:

1. A hue angle calculator comprising:  
  
at least one input channel to receive chroma components of image data;  
  
an octant determining unit to determine which octant a given image data occupies;  
  
an angle determining unit to determine a hue angle of the given image data within an octant; and  
  
an angle offset unit to adjust the hue angle for the image data according to the octant the image data was determined to occupy.
2. The hue angle calculator of Claim 1 wherein said octant determining unit comprises:  
  
an absolute value unit to determine the absolute value of the chroma components;  
  
a swap unit to swap the chroma components depending upon a condition;  
  
an octant memory to store the octant of the image data depending upon the results of said absolute value unit and said swap unit.
3. The hue angle calculator of Claim 1 wherein said angle determining unit comprises:  
  
a divider to divide the chroma components; and  
  
an arc tangent determining unit to determine the angle of the image data within an octant.
4. The hue angle calculator of Claim 1 wherein said angle offset unit comprises:  
  
an octant offset unit to adjust the hue angle of output of said angle determining unit by an offset depending upon the octant the image data was determined to occupy.

5. In an image processing unit, a method of calculating hue angle, the steps of said method comprising:

storing hue angles as a positive binary number with a sign bit;

when multiplying hue angles, multiplying said hue angles as two positive binary number and XORing their respective sign bits; and

when adding said hue angles, testing the sign bits of said hue angles and negating any negative hue angles while adding.

6. In an image processing unit, a method of calculating a hue angle of image data, the method comprising the steps of:

calculating in which octant the hue angle of the input image data resides;

calculating the angle within an octant the image data occupies; and

adding an offset value based on which octant the image data resides to the angle within an octant the image data occupies.

7. The method of Claim 6 wherein the hue angles of primaries of said image processing unit are computed and stored for rendering image data.

8. An image processing unit comprising:

chromaticity triangle storage to store a triangle number for a plurality of hue angles; and

a selector to select a triangle number based upon the hue angle of input image point.

9. The image processing unit of Claim 8 wherein the hue angles are calculated based on a number of degrees around a circle that is a power of 2.

10. The image processing unit of Claim 9 wherein the number of degrees around a circle are 256.

11. An image processing unit comprising:
  - a plurality of primaries with which image data is rendered;
  - a hue angle calculator in which the hue angles of said primaries are stored for rendering said image data;
  - a plurality of comparators to compare the angles of said primaries to the hue angle of an input image point; and
  - a selector to selecting a chromaticity triangle wherein said input image point resides.
12. An image processing system comprising:
  - input means for receiving chroma components of image data; and
  - circuitry coupled to the input means to determine which octant a given image data occupies, to determine a hue angle of the given image data within an octant, and to adjust the hue angle for the image data according to the octant the image data was determined to occupy.
13. The image processing system of Claim 12 wherein said circuitry is to determine the absolute value of the chroma components, to swap the chroma components depending upon a condition, and to store the octant of the image data depending upon the results of said absolute value unit and said swap unit.
14. The image processing system of claim 12 wherein said circuitry is to divide the chroma components, and to determine the angle of the image data within an octant.
15. The image processing system of claim 12 wherein said circuitry is to adjust the hue angle of output of said angle determining unit by an offset depending upon the octant the image data was determined to occupy.

16. An image processing unit to calculate hue angle comprising:
  - means for storing hue angles as a positive binary number with a sign bit;
  - means for multiplying said hue angles as two positive binary number and XORing their respective sign bits; and
  - means for testing the sign bits of said hue angles and negating any negative hue angles while adding said hue angles.
17. The image processing unit of claim 16 further comprising:
  - means for calculating in which octant a hue angle of input image data resides;
  - means for calculating the angle within an octant the image data occupies; and
  - means for adding an offset value based on which octant the image data resides to the angle within an octant the image data occupies.
18. The image processing unit of Claim 17 wherein the hue angles of primaries of said image processing unit are computed and stored for rendering image data.